

TEN CODE
VERSUS
CLEAR SPEECH COMMUNICATION

by

Public Safety Department
Lakewood, Colorado

courtesy

Pierce R. Brooks
Director

Commission on
Peace Officer Standards and Training
State of California

FOREWORD

The Center for Police Management expresses its appreciation to the City of Lakewood, Colorado Public Safety Department, and to its Director, Pierce R. Brooks, for granting POST permission to publish their study on Communications: Ten Code vs. Clear Speech.

This study compares use of a ten code system to clear speech communication. By random sample technique, the error factor of both systems is determined. Test results indicate that clear speech transmissions, insofar as the Lakewood Police Department study is concerned, are more error free than a code system--even with refresher training.

Another factor developed by the study is that clear speech messages, using abbreviated sentences, require less transmission time than coded messages.

Many local factors enter into any study of this nature, and while POST does not conclude that the results of this experiment generally apply to California law enforcement, it should cause police administrators to re-evaluate their own use of radio code systems.

BRADLEY W. KOCH
June 1975

COMMUNICATIONS: TEN CODE VS. CLEAR SPEECH

PART I

In July 1971, the Director of the Lakewood Department of Public Safety requested that a radio communications study be conducted by the Department's Research and Development Division. The purpose of the study was to compare the Associated Public Safety Communications Officers Ten Code (then in use) with a proposed Clear Speech procedure.

Questions to be answered by the study were:

1. Is the Ten Code more or less accurate in law enforcement use than Clear Speech?
2. Does the Ten Code save or cost more time to transmit, receive, and acknowledge a message, than Clear Speech procedure?

The study was initiated by first researching to determine if a similar study had been conducted in the past by any agency of the government, any police organization, any radio vendor, any college or university, or any student. Attempts were made to find articles, books or reports dealing with the subject. Help in finding them was solicited from every available source. These efforts were fruitless; no reports were discovered.

Based upon the stated questions, the hypotheses formulated for the study were:

Hypothesis I. Use of the Clear Speech procedure will reduce confusion and air time used through fewer requests for repeats, mistakes, code substitution, and language substitutions when compared with the Ten Code as originally designed or as modified by the user.

Hypothesis II. Messages transmitted in Clear Speech will take less actual time to transmit than the corresponding Ten Code classification. Air time usage will therefore be reduced.

With the hypotheses formulated, the following design for the study was established:

The first section of the study tested Hypothesis I:

- A. To determine the number of requests for repeats, procedural mistakes, code substitutions, and language substitutions for comparison purposes, samples were drawn from actual radio operations under three conditions:

1. A sample of the Ten Code was recorded as it was being used at the inception of the study.

In July 1969, agencies in the immediate area met and elected to make the APCO Ten Code common to all agencies represented. Since its inception in 1970 until the time of this study, the Lakewood Department of Public Safety used Ten Code. Monitoring carried out prior to the study indicated modifications in the Code had taken place through relaxed use of the Code. Samples were taken of the Code as it was being used to allow comparisons after the retraining of personnel into proper use of the Code.

2. The second sample was taken after retraining of personnel in proper Ten Code procedures. The training consisted of a written directive from the Director of Public Safety and roll call training offered by the researcher for five days following the directive.
 3. Immediately after sample two was taken, use of the Ten Code system was discontinued and the new Clear Speech procedure was introduced. Training was accomplished through written directives and roll call training. Included in the training were dispatchers and agents. Five weeks passed before the third sample was taken to allow for acclimation to the new procedure.
- B. All samples were taken at random on selected Mondays and Fridays. By doing so, more agents and dispatchers had an opportunity to be included in the sample since watch schedules are such that different agents are on duty on Mondays than are on duty Fridays. Each sample included a Monday and a Friday. Further, the samples were taken from all three watches on both days. In effect, every agent who is ever on the air had an opportunity to have his calls be part of the sample. No agent or dispatcher had been allowed to know prior to the sample-taking what date was selected. Although samples were taken from routinely kept tapes, the sampler had not, prior to the sample-taking, listened to any of the tapes. The dates were selected from the calendar with the only constraint being the days of the week and the calendar time that the training or retraining in the various procedures took place. Each sample on each day consisted of tapes taken of radio operations from 0900 to 1300, or four hours, of Watch I and 2100 to 0100 (four hours) of Watch II and Watch III, which overlap and work together during these hours. Sample Fridays did not necessarily follow Mondays or vice versa. Thus, the sample days could have fallen in two different weeks. No pattern was established.
- C. The test itself consisted of a tabulation of all mistakes made in use of the respective procedures. Mistakes were defined for the study as (1) any substitution of one code number or classification for another; (2) use of any code other than the Code in service at that time, including transfer of Ten Code into English and structuring of various codes into complete

sentences; or (3) disregarding Code procedures in any manner. Standards for judgment of both communication procedures were taken from "The Public Safety Communications Standard Operating Procedure Manual" published by the Associated Public Safety Communications Officers, Inc., 1970 edition.

Because the number of transmissions contained in each sample was unwieldy for test purposes, a random portion of each sample was compared. This procedure also allowed for control over the size of each sample. This was necessary because there is no way of controlling the number of calls included in each sample tape since each day may vary considerably due to many factors. We therefore decided on testing a random sample of two hundred calls from each set of tapes. The number two hundred was arrived at arbitrarily and had, by itself, no particular significance.

To randomize the sample, a secretary was asked to choose a number between one and five hundred. This number was to become the starting footage point on the tapes to begin taking the test sample. She chose two hundred fifty.

The tapes were recorded at a speed of fifteen-sixteenths inches per second and had approximately nine hundred feet of recording. The decision was then made that each watch should be equally sampled. Thus, one hundred calls from each day of treatment were examined and broken up in the following manner:

WATCH I	34 Calls
WATCH II & III	<u>66 Calls</u>
	100 Total for each day

The tapes were then mounted, run forward to two hundred fifty feet (as measured by the recorder's footage meter), listened to, and tabulated. Each call was counted which could be understood. Very few were unintelligible. If a call was unintelligible, it was not tabulated and not included in the test. The results are shown on the following page.

SAMPLES

TAPES	1 Ten Code Before Retraining	2 Ten Code After Retraining	3 Clear Speech
DAY ONE, WATCH I - ERRORS	18	14	3
DAY ONE, WATCH II & III - ERRORS	42	30	3
DAY TWO, WATCH I - ERRORS	18	13	4
DAY TWO, WATCH II & III - ERRORS	35	28	4
TOTAL ERRORS WITHIN 200 CALLS	113	85	14
PERCENTAGE	55.1%	42.5%	7%

PART II

The second section of the study tested Hypothesis II.

Hypothesis II. Messages being transmitted by the dispatcher in Clear Speech will take less actual time to transmit than the corresponding Ten Code classification. Air time usage will therefore be reduced.

Research design for this section of the study consisted of measurement and comparison of the length of sounds made when a Ten Code message and the corresponding Clear Speech message were enunciated by dispatchers.

Measurement was accomplished through the use of a stylus which was activated by a voice-operated relay. By passing a strip of paper under the stylus at a set speed, it was possible to measure the length of a sound by the markings the stylus made. The paper is marked at exact intervals to allow for measurement. The stylus is set to oscillate at a set speed by a Puretone Oscillator, thus allowing for a secondary measurement created by the number of points drawn by the stylus. Each point constituted one-twentieth of a second. Equipment was secured through LaVar Best, PhD, of the University of Denver Speech and Hearing Center. Proper names for the equipment are Servo Strip Recorder, voice-operated relay, and Puretone Oscillator. The paper is manufactured especially for the Servo Recorder by the producers of the Servo Recorder.

Recordings were taken of the voices of dispatchers as they pronounced the Ten Code message and the equivalent Clear Speech message. This was accomplished by placing the dispatchers in a soundproof room with a tape recorder.

Each of the dispatchers was asked to read the various code classifications into the recorder microphone from flash cards which were presented to them by the researcher. Flash cards were used to eliminate rhythmic utterances and to keep the reader from falling into a pattern or meter which would tend to make spoken words the same length. The cards were presented with long pauses between some and short pauses between others. Further, the recorder was stopped at impulse and the attention of the reader diverted by conversation during the session, thus creating further assurance that rhythm did not become a factor.

The recordings were made after the Clear Speech procedure had been in use for thirty days. It was presumed that the dispatchers would then be accustomed to the procedure and find little problem with reading it as a result of prior experience with it. Dispatchers were also told a study was in progress to determine the effectiveness of both procedures and that upon the results of that study, a determination would be made as to which procedure the Department would ultimately adopt. They were further asked to remain proficient

in the Ten Code procedures until the determination was made. Thus, little or no proficiency would be lost in their ability to read the Ten Code. At the beginning of each recording session, the dispatchers to be recorded were asked to imagine themselves as actually dispatching, and to read the card as though they were on duty at the dispatch station.

Four full-time dispatchers were recorded in the same room using the same equipment, and were given the same instructions. The dispatchers were chosen from whomever was on duty. The researcher had no prior knowledge as to which four dispatchers of the seven employed would give the samples. To the researcher, any combination would have been acceptable. Each dispatcher was recorded separately.

When the recordings were complete, they were run through the measuring mechanism and the results were tabulated.

The equipment was set to measure lengths of sounds in twentieths of a second. The tapes were run through the equipment and the results were tabulated by counting oscillations and by measuring lengths of sound-caused stylus marking on the preprinted Servo Strip paper. Each word represented on the Servo Strip was measured in both described ways, two times each. In no case was any discrepancy between measurements noted. When the measurements were completed, the individual dispatcher's overall time for each procedure was summed for comparison with the overall average of all four scores. The results appear below:

Procedure	Dispatcher				Average
	1	2	3	4	
Ten Code	1031	774	913	850	892
Clear Speech	896	698	824	729	784.5
Difference	135	85	89	121	107.5

* Note

All numbers represent twentieths of seconds.

Through simple mathematical calculations, it is possible to give a time saved or lost statement projected over a twenty-four hour period. Those calculational operations are shown below:

Average Difference

$$\text{Ten Code Average} = \text{Percent of Time Saved} = \frac{107.5}{892} = .12$$

$$\text{Percent of time saved X 24 hours} = .12 \times 24 = 2.88 \text{ hours.}$$

$$\text{Minutes - Percent of hours X 60} = .88 \times 60 = 52.8 \text{ minutes.}$$

CONCLUSION

Time saved by use of the Clear Speech procedure if transmission continued over a twenty-four hour period uninterrupted = two hours, 52.8 minutes. In round figures to the minute, two hours, 53 minutes, each twenty-four hour day.

CLEAR SPEECH PROCEDURES

Attached is a copy of the new Clear Speech Procedure and five new codes which will replace the 10-Code Procedures of radio message transmission beginning January 28, 1972. All personnel who at any time have occasion to use the Public Safety radio equipment will be responsible to use the Clear Speech Procedure on and after January 28, 1972.

Because communication is extremely important to our function, the Clear Speech Procedure must be used as follows:

1. Use radios only when necessary.
2. Keep messages short; use as few words as possible. The most common messages we use are outlined on the procedure sheet. If you have a message not outlined, keep it to a few words.

Example of correct usage: DISP.: 1 - Adam 12
UNIT : 1 - Adam 12
DISP.: Contact Mr. Jones, 1-2-3-4 Main
St., reference vandalism.
UNIT : 1-2-3-4 Main St., Roger
DISP.: 13:30
OR
UNIT : 1 - Adam 12
DISP.: 1 - Adam 12
UNIT : Request ambulance (reason) 1-2-3-4
Main St.
DISP.: 1-2-3-4 Main St., Roger, 13:30.

Note that in the examples, the messages are not necessarily complete sentences. A few words, such as "in progress, robbery, 1-2-3-4 Main St.," will usually get the message across. Any more words takes up valuable time, ties up the radio system and may cause confusion. Use only those words which are essential to the message and no more.

To explain the Clear Speech classifications, see the chart below.

<u>W A S</u> (TEN CODE)	<u>N O W</u> (CLEAR SPEECH PROCEDURE)
10-0	Use caution
10-1	Unable to copy - change location
10-3	Stop transmitting
10-4	Roger
10-5	Relay
10-6	Busy
10-7	Out at . . .
10-8	Clear
10-9	Say again
10-12	Stand by
10-13	Weather report/road report
10-15	Disturbance
10-17 A	Theft
10-17 B	Vandalism
10-17 C	Shoplifting
10-18	Urgent
10-19	Return to . . .
10-20	Location
10-21	Call . . .
10-22	Disregard
10-23	On scene
10-25	Meet . . . or contact . . .
10-26	Detaining subject, expedite
10-27	Drivers License information on . . .
10-28	Registration information on . . .
10-29	Check for wanted on . . .
10-31 A	Burglary
10-31 B	Robbery
10-31 C	Homicide
10-31 D	Kidnapping
10-31 E	Shooting
10-38	Traffic stop on . . .
10-42	Off duty
10-44	Request for . . .
10-46	Assist motorist
10-49	Fast bound green light out (etc.)
10-50	Traffic (F, PD) *

*F - Fatal

PD - Property
Damage

W A S
(TEN CODE)

N O W
(CLEAR SPEECH PROCEDURE)

10-50 cont'd

10-56

10-63

10-70

10-74

10-76

10-77

10-78

10-79

10-80

10-89

10-90

10-91

10-92

10-95

10-97

10-98

10-99

Traffic

- Hit and run
- Injury
- No injury reported
- Unknown
- Private property, location

Drunk pedestrian

Prepare to copy

Fire

Negative

En route . . .

ETA (Estimated time of arrival)

Request assistance

Notify coroner (to be done by phone
whenever possible)

Chase

Bomb threat

Alarm (type of alarm)

Pick up prisoner

Parking complaint

Prisoner in custody

Check traffic signal

Prison/jail break

Wanted/stolen

ROGER - To be used as acknowledge-
ment.

AFFIRMATIVE - To be used when
"yes" is needed.

HELP - To be used when in danger
and urgent assistance is
needed.

CODES

ONE - Informs all units to STANDBY - STOP TRANSMITTING. Do not transmit, except for emergency messages, while Code 1 is in effect. Dispatch shall announce, "Clear Code 1," when the condition is secured.

TWO - Indicates an "urgent" call short of an "emergency" situation. A Code 2 call has priority over all other police activities except "emergencies."

Proceed directly to Code 2 calls as quickly as is consistent with safety. Agents may, in exceptional cases, use their emergency equipment (both visual and audible to comply with state law) to transverse an otherwise clear intersection against a red traffic control device. Once clear of the intersection - turn off the emergency equipment.

THREE - Indicates an EMERGENCY call. Red lights and siren are authorized. Proceed as quickly as possible with due regard for safety, and in compliance with the laws governing emergency vehicles.

FOUR - Used to indicate that sufficient units have responded to a location, or that assistance is not needed, or is no longer needed.

FIVE - Used when Wanted/Records checks are requested by an agent to alert the agent of a wanted felon, a person known to be dangerous or a person known to be mentally unstable.

A backup unit shall be dispatched Code 2 on all Code 5's.

Personnel will NOT proceed with Code 5 details until the receiving unit requests same. The unit receiving a Code 5 will request the details when he is in a safe position to do so, which might not be until his backup arrives.

SIX - When an agent is dispatched to a traffic accident, and the dispatcher states, "Code 6," the agent will advise the drivers involved to proceed to the station to file their reports. This will only be done if there are no injuries, no unusual circumstances and the vehicles are safely operable. Driver Exchange Forms will be completed at the scene to include the C. R. number.

SEVEN - Indicates "out of service - personal."

EIGHT - Assist a fire department.

CODES

ONE - Informs all units to STANDBY - STOP TRANSMITTING. Do not transmit, except for emergency messages, while Code 1 is in effect. Dispatch shall announce, "Clear Code 1," when the condition is secured.

TWO - Indicates an "urgent" call short of an "emergency" situation. A Code 2 call has priority over all other police activities except "emergencies."

Proceed directly to Code 2 calls as quickly as is consistent with safety. Agents may, in exceptional cases, use their emergency equipment (both visual and audible to comply with state law) to transverse an otherwise clear intersection against a red traffic control device. Once clear of the intersection - turn off the emergency equipment.

THREE - Indicates an EMERGENCY call. Red lights and siren are authorized. Proceed as quickly as possible with due regard for safety, and in compliance with the laws governing emergency vehicles.

FOUR - Used to indicate that sufficient units have responded to a location, or that assistance is not needed, or is no longer needed.

FIVE - Used when Wanted/Records checks are requested by an agent to alert the agent of a wanted felon, a person known to be dangerous or a person known to be mentally unstable.

A backup unit shall be dispatched Code 2 on all Code 5's.

Personnel will NOT proceed with Code 5 details until the receiving unit requests same. The unit receiving a Code 5 will request the details when he is in a safe position to do so, which might not be until his backup arrives.

SIX - When an agent is dispatched to a traffic accident, and the dispatcher states, "Code 6," the agent will advise the drivers involved to proceed to the station to file their reports. This will only be done if there are no injuries, no unusual circumstances and the vehicles are safely operable. Driver Exchange Forms will be completed at the scene to include the C. R. number.

SEVEN - Indicates "out of service - personal."

EIGHT - Assist a fire department.